

CLAIMS

What is claimed is:

1. A photopolymerizable element for use as a flexographic printing plate comprising:

- 5           (a) a support;
- (b) a photopolymerizable elastomeric layer on the support, comprising a binder, at least one monomer, a photoinitiator, an onium salt and a leuco dye.

2. The photopolymerizable element of Claim 1 wherein the onium salt is  
10 selected from the group consisting of phosphonium salts, selenonium salts, triarylselenonium salts, aryldiazonium salts, iodonium salts, diaryliodonium salts, sulfonium salts, triarylsulphonium salts, dialkylphenacylsulphonium salts, triarylsulphoxonium salts, aryloxydiarylsulphoxonium salts, dialkylphenacylsulphoxonium salts, and combinations thereof.

15           3. The photopolymerizable element of Claim 2 wherein the onium salt is selected from the group consisting of sulfonium salts, phosphonium salts, and iodonium salts.

4. The photopolymerizable element of Claim 1 wherein the leuco dye is a cyclic lactone dye.

20           5. The photopolymerizable element of Claim 4 wherein the cyclic lactone dye is selected from the group consisting of aminotriarylmethane compounds, amino-2,3-dihydroanthraquinones, and tetrahyhalo-p,p'-bihenols.

6. The photopolymerizable element of Claim 4 wherein the cyclic lactone dye is selected from the group consisting of

- 25           6'-(diethylamino)-3'-methyl-2'-(phenylamino) spiro(isobenzofuran-1(3H),9'-(9H)xanthen)-3-one;
- 2'-di(phenylmethyl) amino-6'-(diethylamino)spiro(isobenzofuran-1(3H),9'-(9H)xanthen)-3-one;
- 30           6-(dimethylamino)-3,3-bis(4-dimethylamino)phenyl-1(3H)-isobenzofuranone;
- 6-(dimethylamino)-3,3-bis[4-(dimethylamino)phenyl]-1(3H)-isobenzofuranone;
- 35           2'-[bis(phenylmethyl)amino]-6'-diethylaminospirobenzofuran-1(3H),9'-[9H]xanthen]-3-one;

3-[bis(4-octylphenyl)amino]-3-[4-dimethylamino)phenyl]-3(3H)-  
izobenzofuranone; and

3,3-bis(1-butyl-2-methyl-1H-indol-3-yl)-1(3H)-izobenzofuranone.

7. The photopolymerizable element of Claim 1 wherein the onium salt is  
5 sensitive to the same wavelength of radiation as the photoinitiator.

8. The photopolymerizable element of Claim 1 wherein the onium salt is  
sensitive to radiation between 310 and 400 nm.

9. The photopolymerizable element of Claim 7 wherein the onium salt  
absorbs radiation between 345 and 365 nm.

10. The photopolymerizable element of Claim 1 wherein the amount of  
10 the onium salt is 0.2 to 0.6% by weight, based on the total weight of the  
components in the photopolymerizable layer.

11. The photopolymerizable element of Claim 1 wherein the onium salt is  
present in greater reactive amount than the leuco dye.

12. The photopolymerizable element of Claim 4 wherein the amount of  
15 the onium salt is at least twice the amount of the cyclic lactone dye.

13. The photopolymerizable element of Claim 1 wherein the amount of  
the leuco dye is 0.1 to 0.3 % by weight, based on the total weight of the  
components in the photopolymerizable layer.

14. The photopolymerizable element of Claim 1 further comprising an  
20 actinic radiation opaque layer disposed above a surface of the photopolymerizable  
layer opposite the support.

15. The photopolymerizable element of Claim 1 further comprising a  
release layer disposed above a surface of the photopolymerizable layer opposite  
25 the support.

16. The photopolymerizable element of Claim 1 further comprising an  
elastomeric layer on the surface of the photopolymerizable layer opposite the  
support, the elastomeric layer comprising an elastomeric binder, a second onium  
salt and a second leuco dye, wherein both of the second salt and the second leuco  
30 dye can be the same or different than the onium salt and leuco dye in the  
photopolymerizable layer.

17. The photopolymerizable element of Claim 1 wherein the  
photopolymerizable layer is at least 0.020 inch (0.05 cm) thick.

18. The photopolymerizable element of Claim 1 wherein the binder is  
35 elastomeric.

19. The photopolymerizable element of Claim 1 wherein the  
photoinitiator is sensitive to radiation between 310 and 400 nm, and the

photopolymerizable layer further comprises a second photoinitiator sensitive to radiation between 220 and 300 nm.

20. A process for making a flexographic printing plate comprising:

- (a) providing a photosensitive element comprising a support and a photopolymerizable elastomeric layer on the support, the photopolymerizable layer comprising a binder, at least one monomer, a photoinitiator, an onium salt and a leuco dye;
- (b) imagewise exposing the photopolymerizable layer to actinic radiation forming polymerized portions and unpolymerized portions in the layer;
- (c) treating the element of (b) to remove the unpolymerized portions and form a relief surface suitable for printing.

21. The process of Claim 20 wherein the treating step (c) is selected from the group consisting of

- (a) processing with at least one washout solution selected from the group consisting of solvent solution, aqueous solution, semi-aqueous solution, and water; and
- (b) heating the element to a temperature sufficient to cause the unpolymerized portions to melt, flow, or soften, and contacting the element with an absorbant material to remove the unpolymerized portions.

22. The process of Claim 20 further comprising during imagewise exposing in portions of the photopolymerizable layer which are exposed to actinic radiation converting the leuco dye to its color form by reaction of an acid of the onium salt thereby providing a change in color of the polymerized portions relative to the unpolymerized portions.

23. The process of Claim 20 further comprising backflash exposing the photopolymerizable layer through the support to actinic radiation to form a floor.

24. The process of Claim 23 wherein the product of step (c) has a contrast in color between raised areas of the relief surface and the floor of the plate.

25. The process of Claim 24 further comprising mounting the element of step (c) onto a carrier, sleeve, or printing cylinder based upon the color contrast of the imaged relief surface.

26. The process of Claim 20 wherein the actinic radiation is between 310 and 400 nm.

27. The process of Claim 20 wherein the photopolymerizable layer is at least 0.020 inch (0.05 cm) thick.

28. The process of Claim 20 wherein the onium salt is present in greater reactive amount than the leuco dye and the leuco dye is 0.1 to 0.3 % by weight, based on the total weight of the components in the photopolymerizable layer.

29. The process of Claim 20 wherein during imagewise exposing step, the actinic radiation is providing at least 1.0 joules/cm<sup>2</sup> to the photopolymerizable layer.

30. A flexographic printing plate prepared according to Claim 23 having a contrast in color between raised areas of the relief surface and the floor of the plate.

31. The photopolymerizable element of Claim 1 wherein the photopolymerizable layer having a first color is exposed to actinic radiation of at least 1 joules/cm<sup>2</sup> to change the photopolymerizable layer to second color.

32. The photopolymerizable element of Claim 1 wherein the photoinitiator when exposed to actinic radiation generates free radicals which initiate the polymerization of the at least one monomer.